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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/823,839	03/30/2001	Prashant B. Phatak	CY-0019	6118

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EXAMINER
GUERRERO, MARIA F

ART UNIT	PAPER NUMBER
2822	

DATE MAILED: 08/29/2003

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)	
	09/823,839	PHATAK ET AL.	
	Examiner	Art Unit	
	Maria Guerrero	2822	

-- The MAILING DATE of this communication appears on the cover she t with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *18 June 2003* .

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-22* is/are pending in the application.

4a) Of the above claim(s) *20-22* is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-16,18 and 19* is/are rejected.

7)☒ Claim(s) *17* is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

11)☐ The proposed drawing correction filed on _____ is: a)☐ approved b)☐ disapproved by the Examiner.

If approved, corrected drawings are required in reply to this Office action.

12)☐ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. §§ 119 and 120

13)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____ .

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

14)☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).

a) ☐ The translation of the foreign language provisional application has been received.

15)☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO-1449) Paper No(s) _____ .
4) ☐ Interview Summary (PTO-413) Paper No(s). _____ .
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: .

DETAILED ACTION

1. This Office Action is responsive to the communication filed June 18, 2003.

Claims 6 and 12 are canceled.

Claims 1-5, 7-11, and 13-22 are pending.

Election/Restrictions

2. Claims 20-22 are withdrawn from further consideration pursuant to 37 CFR 1.142(b), as being drawn to a nonelected invention, there being no allowable generic or linking claim. Applicant timely traversed the restriction (election) requirement in Paper No. 4.

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

3. Claims 1-3, 5, 7, and 9-10 are rejected under 35 U.S.C. 103(a) as being unpatentable over Lin et al. (U.S. 6,100,202) in view of Chen et al. (U.S. 6,541,394).

Lin et al. teaches varying a dopant supply rate for a doped insulating layer, providing different dopant supply rate for different time periods, the doped insulating layer comprising phosphosilicate glass (col. 5, lines 60-65, col 15, lines 1-40). Lin et al. teaches increasing the dopant supply rate, etching a contact hole through the doped insulating layer, varying the dopant supply rate for an initial thickness of the insulating

film, maintaining a constant dopant supply rate for a second period of time (Fig. 3-6, col. 5, lines 60-67, col. 9, lines 5-10, 25-40, col. 10, lines 25-45).

Furthermore, Lin et al. shows a forming a pre-metal dielectric layer having a thickness of from 500 to about 100 angstroms, the second deposition step forming a layer of thickness about 9000 angstroms, the total thickness of the doped silicate glass layer being from about 10000 to about 11000 angstroms (col. 7, lines 60-62, col. 10, lines 15-17, col. 15, lines 25-30).

Lin et al. does not specifically show increasing the substrate temperature. However, Chen et al. teaches increasing the temperature during the formation of the insulating layer (Fig. 2,6, Abstract, col. 5, lines 1-30, col. 6, lines 5-20).

Therefore, it would have been obvious to a person of ordinary skill in the art at the time of the invention to modify Lin et al. reference by increasing the temperature as taught Chen et al. in order to reduce stress and to increase reliability (Chen et al., col. 3, lines 31-33).

Claim 4 is rejected under 35 U.S.C. 103(a) as being unpatentable over Lin et al. (U.S. 6,100,202) and Chen et al. (U.S. 6,541,394) as applied to claims 1-3, 5, 7, and 9-10 above, and further in view of Vassiliev et al. (U.S. 6,355,581) (of record).

Regarding claim 4, the combination of Lin et al. and Chen et al. does not specifically show the process being a high-density plasma deposition process. However, Vassiliev et al. shows forming an insulating film by high-density plasma deposition process (col. 3, lines 40-55).

Therefore, it would have been obvious to a person of ordinary skill in the art at the time of the invention to modify the combination of Lin et al. and Chen et al. by including the high-density plasma deposition process as taught Vassiliev et al. in order to reduce the formation of voids in the film (Vassiliev et al., col. 3, lines 40-45).

Claim 8 is rejected under 35 U.S.C. 103(a) as being unpatentable over Lin et al. (U.S. 6,100,202) and Chen et al. (U.S. 6,541,394) as applied to claims 1-3, 5, 7, and 9-10 above, and further in view of Wang et al. (U.S. 4,376,672).

Regarding claim 8, the combination of Lin et al. and Chen et al. does not specifically show the phosphorus concentration being greater than about 6% by weight. However, Wang et al. shows that phosphosilicate glass having a phosphorous concentration greater than 7% by weight is well known in the art. Wang et al. also shows typical etch results for phosphosilicate glass (col. 12, lines 5-20).

Therefore, it would have been obvious to a person of ordinary skill in the art at the time of the invention to modify the combination of Lin et al. and Chen et al. by including the teaching Wang et al. The modification would provide a doped insulating film having better control etching rate.

4. Claims 11,13-16 and 18-19 are rejected under 35 U.S.C. 103(a) as being unpatentable over Lin et al. (U.S. 6,100,202) in view of Barnes et al. (U.S. 6,521,546) and Wang et al. (U.S. 4,376,672).

Lin et al. teaches varying a dopant supply rate for a doped insulating layer, providing different dopant supply rate for different time periods, the doped insulating layer comprising phosphosilicate glass (col. 5, lines 60-65, col. 15, lines 1-40). Lin et al.

teaches increasing the dopant supply rate, etching a contact hole through the doped insulating layer, varying the dopant supply rate for an initial thickness of the insulating film, maintaining a constant dopant supply rate for a second period of time (Fig. 3-6, col. 5, lines 60-67, col. 9, lines 5-10, 25-40, col. 10, lines 25-45).

Furthermore, Lin et al. shows a forming a pre-metal dielectric layer having a thickness of from 500 to about 100 angstroms, the second deposition step forming a layer of thickness about 9000 angstroms, the total thickness of the doped silicate glass layer being from about 10000 to about 11000 angstroms (col. 7, lines 60-62, col. 10, lines 15-17, col. 15, lines 25-30).

Lin et al. does not specifically show compensating for a temperature dopant gradient and the phosphorus concentration being greater than about 7% by weight. However, Barnes et al. teaches that the dopant concentration is dependent from the reaction temperature (col. 6, lines 40-55, col. 7, lines 14-18). Barnes et al. shows using a feed back-based temperature control system and a process gas control system that adjust the flow rates of the gas as necessary (col. 3, lines 15-23, 55-67).

Wang et al. shows that phosphosicalate glass having a phosphorous concentration greater than 7% by weight is well known in the art. Wang et al. also shows typical etch results for phosphosilicate glass (col. 12, lines 5-20).

Since Lin et al., Barnes et al. and Wang et al. are from the same field of endeavor of depositing doped insulating layers, the purpose disclosed by Barnes et al. and Wang et al. would have been recognized in the pertinent art of Lin et al.

Therefore, it would have been obvious to a person of ordinary skill in the art at the time of the invention to modify Lin et al. reference by including the teachings of Barnes et al. and Wang et al. The modification would provide a doped insulating film having better control etching rate.

Allowable Subject Matter

5. Claim 17 is objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

The following is a statement of reasons for the indication of allowable subject matter: there is evidence indicating that the supply ratio varies from about 30% to 40.5 % is critical (Fig. 6, page 10).

Response to Arguments

6. Applicant's arguments with respect to claims 1-5 and 7-10 have been considered but are moot in view of the new ground(s) of rejection.

Applicant's arguments filed June 18, 2003 have been fully considered but they are not persuasive. Claims 11, 13-16, 18-19 stand rejected.

Applicant argued that Barnes et al. does not teach that the dopant concentration is dependent from the reaction temperature. Applicant argued that the Barnes et al. shows the dielectric constant varies according to reaction temperature. However, Barnes et al. is cited to show the dependency between the dopant concentration and the reaction temperature. In addition, Barnes et al. discloses the dielectric constant can

be varied as a function of the reaction temperature as well as the composition of the gas mixture during layer formation (col. 7, lines 10-17).

In response to applicant's arguments against the references individually, one cannot show nonobviousness by attacking references individually where the rejections are based on combinations of references. See *In re Keller*, 642 F.2d 413, 208 USPQ 871 (CCPA 1981); *In re Merck & Co.*, 800 F.2d 1091, 231 USPQ 375 (Fed. Cir. 1986).

Regarding the use of closed loop control of dopant and active temperature feedback, Barnes et al. is cited to show that the use of a feed back-based temperature control system and a process gas control system that adjust the flow rates of the gas as necessary is conventional in the art (col. 3, lines 15-23, 55-67).

Furthermore, the test for obviousness is not whether the features of a secondary reference may be bodily incorporated into the structure of the primary reference; nor is it that the claimed invention must be expressly suggested in any one or all of the references. Rather, the test is what the combined teachings of the references would have suggested to those of ordinary skill in the art. See *In re Keller*, 642 F.2d 413, 208 USPQ 871 (CCPA 1981).

Conclusion

7. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Maria Guerrero whose telephone number is 703-305-0162.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Amir Zarabian can be reached on 703-308-4905. The fax phone numbers for the organization where this application or proceeding is assigned are 703-308-7722 for regular communications and 703-308-7724 for After Final communications.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is 703-308-0956.

Maria Guerrero
Patent Examiner
August 21, 2003